

REMARKS

The Office action mailed February 14, 2006, indicated that claim 14 contains allowable subject matter, rejected claims 1-13 and 15-37, and did not consider claims 38-54. The applicant respectfully requests reconsideration of the rejections in light of the amendments and remarks presented in this reply.

I. Claim 14

The applicant appreciates the Office action's indication that claim 14 contains allowable subject matter. In response, this reply rewrites claim 14 in independent form to include the limitations of its base claim.

II. Response to rejections under § 112

Claims 15 and 28 stand rejected under 35 U.S.C. § 112, second paragraph. This reply responds to these rejections by amending claims 1 and 20 to obviate this rejection.

III. Response to rejections under § 103(a)

Claims 1-13, 16-27, and 29-37 stand rejected under 35 U.S.C. § 103(a) as unpatentable over U.S. Patent No. 6,232,626 ("Rhodes") in view of U.S. Patent No. 5, 818, 322 ("Tasumi"). These rejections are respectfully traversed.

A. Claims 1-13 and 16-19

Regarding claim 1, the Office action acknowledges that Rhodes does not teach a photodiode comprising a plurality of layers, wherein "at least a first layer has a first band gap and at least a second layer has a second band gap" (see page 3, lines 4-10, of the Office action). However, the Office action then asserts that Tasumi discloses this

feature and that one of ordinary skill would have applied Tasumi to Rhodes. This assertion is respectfully traversed for the following reasons.

Rhodes discloses methods applicable to CMOS imaging apparatuses in which an image is captured by an array of pixels having associated photodiodes for charge accumulation and amplification (see col. 10, ll. 20-24). Figure 5 illustrates such an imaging apparatus. In contrast, Tasumi relates to a photosensitive element for optical communications. According to Tasumi, a photosensing portion 2 is buried and an optical fiber is fixed at the same height as the photosensing portion to introduce light in parallel along the surface. Tasumi teaches that this allows the step on the substrate surface to be eliminated thereby allowing an optical driver 3 to be formed on the same chip as the photosensing portion 2 (col. 4, ll. 1-10). Significantly, Tasumi does not teach an imager having an array of photodiodes for capturing an image. As such, the teachings of Tasumi relating to sending and receiving optical signals on the same chip bear no relation to sensing an image using an array of pixels.

As such, there is no reason to believe that at the time of the invention one of ordinary skill would have been motivated to replace the imager array photodiode of Rhodes with the optical communications photosensitive element of Tasumi.

Additionally, as the Office action fails to state a proper source for a motivation to combine, the rejection appears to rely on improper hindsight reasoning. As explained in the M.P.E.P., "[t]here are three possible sources for a motivation to combine references: the nature of the problem to be solved, the teachings of the prior art, and the knowledge of persons of ordinary skill in the art." M.P.E.P. § 2143(I). In the following case, there is no apparent source other than the applicant's own teachings for the Office action's statement that it would have been obvious "in order to improve

photo converting efficiency of the photosensing element." The Office action fails to provide a proper motivation to combine the references.

Regarding claims 2-13 and 16-19 each one of these claims is allowable at least because it depends on an allowable base claim.

B. Claims 20-27 and 29-31

Regarding claim 20, the Office action acknowledges that Rhodes does not teach a photodiode comprising a plurality of layers "wherein the layers are configured such that a difference between the conduction band energies of the first and at least second materials and a difference between the valence band energies of the first and at least second materials promotes ionization by a first carrier type and suppresses ionization by a second carrier type" (see page 3, lines 4-10, of the Office action). However, the Office action then asserts that Tasumi discloses this feature and that one of ordinary skill would have applied Tasumi to Rhodes. This assertion is respectfully traversed for the following reasons.

First, the Office action cites no support for the assertion that "[i]t is noted in the art that this avalanche photodiode promotes ionization by a first carrier type and suppress ionization by a second carrier type". If this assertion is true, evidence of the same is respectfully requested.

Moreover, and in any event, as explained above, Rhodes relates to an imager while Tasumi relates to a structure providing optical communication. As such, there is no reason to believe that at the time of the invention one of ordinary skill would have been motivated to replace the imager photodiode of Rhodes with the optical communications photosensitive element of Tasumi.

Furthermore, as explained above, the Office action fails to state a proper source for the motivation to combine. As such, the rejection relies on improper hindsight reasoning.

Regarding claims 21-27 and 29-31, each one of these claims is allowable at least because it depends on an allowable base claim.

C. Claims 32-34

Regarding claim 32, the Office action acknowledges that Rhodes does not teach a "photodiode comprising alternating layers of Si and SixGe1-x" (see page 3, lines 4-10, of the Office action). However, the Office action then asserts that Tasumi discloses this feature and that one of ordinary skill would have applied Tasumi to Rhodes. This assertion is respectfully traversed for the following reasons.

As explained above, Rhodes relates to an imager while Tasumi relates to a structure providing optical communication. As such, there is no reason to believe that at the time of the invention one of ordinary skill would have been motivated to replace the imager photodiode of Rhodes with the optical communications photosensitive element of Tasumi.

Furthermore, as explained above, the Office action fails to state a proper source for the Office action's motivation to combine. As such, the rejection relies on improper hindsight reasoning.

Regarding claims 33 and 34, each one of these claims is allowable at least because it depends on an allowable base claim.

D. Claims 35-37

Regarding claim 35, the Office action acknowledges that Rhodes does not teach a "photodiode comprising layers of a first material and at least a second material in contact with one another, wherein the first and second materials are selected from the group consisting of Si, $\text{Si}_x\text{Ge}_{1-x}$, $\text{Si}_x\text{Ge}_{1-x}\text{Cy}$, GaAs, GaAlAs, InP, InGaAs, or InGaAsP, wherein the layers are configured to promote ionization by a first carrier type and suppress ionization by a second carrier type" (see page 3, lines 4-10, of the Office action). However, the Office action then asserts that Tasumi discloses this feature and that one of ordinary skill would have applied Tasumi to Rhodes. This assertion is respectfully traversed for the following reasons.

First, as explained above, the Office action fails to support the assertion that "[i]t is noted in the art that this avalanche photodiode promotes ionization by a first carrier type and suppress ionization by a second carrier type". If this assertion is true, evidence of the same is respectfully requested.

Moreover, and in any event, as explained above, Rhodes relates to an imager while Tasumi relates to a structure providing optical communication. As such, there is no reason to believe that at the time of the invention one of ordinary skill would have been motivated to replace the imager photodiode of Rhodes with the optical communications photosensitive element of Tasumi.

Furthermore, as explained above, the Office action fails to state a proper source for the motivation to combine. As such, the rejection relies on improper hindsight reasoning.

Regarding claims 36 and 37, each one of these claims is allowable at least because it depends on an allowable base claim.

IV. Conclusion

In view of this reply, the applicant believes the pending application is in condition for allowance. If there are any formal matters remaining after this reply, the applicant requests the examiner to telephone the undersigned. If there are any additional fees associated with the filing of this reply, please charge them to Deposit Account No 04-1073.

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Respectfully submitted,

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